Technical Note Addendum

Modifying the LLNL Rangefinder for Operation at 5.8GHz

Transmitter component changes – Rev_B

These changes replace Rev_A changes entirely

1. Change C3 to a 47 ohm 0805 resistor
2. Delete R2
3. Delete R4
4. Delete 5nH trace inductor in shunt with output, located at SMA
5. Shunt C6 with 1000pF 0805 chip cap with ground end soldered to SMA connector

6. Add 1.2cm wire to Q1 drain and dress along ground plane towards SMA and C6 and tune by adjusting height to ground plane for a null at 5.4GHz in output spectrum.

7. Cut trace between U1 pin 2 and pin 3, and connect a 22pF 0805 chip cap between pins 2,3.
8. Add a 200 ohm resistor from U1 pin 3 to ground (sets RF pulse width).

11/18/00

McEwan Technologies, LLC
P.O. Box 10601
Pleasanton, CA 94588-0601

925-484-0126 phone
925-484-0592 fax
temin@ix.netcom.com

Technical Note Addendum
Modifying the LLNL Modular Rangefinder for Operation at 5.8GHz

Detailed Component Changes

Transmitter modifications

C3=10pF
Shunt C6 with 1000pF 0805 chip cap with ground end soldered to SMA connector
C5 deleted, and replaced with 1.25cm long parallel wires (coupled-line resonators)
R4 deleted
Delete 5nH PCB trace inductor in shunt with output at SMA
Add 1.1cm wire to ground and dressed in parallel to the coupled line resonators (5.4GHz trap)

> The resonators and trap should be tuned while monitoring the transmitted output on a spectrum analyzer. The resonator coupled to the GaAsFET drain fine-tunes the oscillator. All three wire resonators should be designed into the PCB as microstrips.

A brass shield was soldered over the transmitter PCB.

Receiver modifications

C8=1.5pF
C4=100pF
Delete R6 and the trace inductor connected to the ground end of R6.
Add a 4nH inductor between C6 and CR1 (input matching at 5.8GHz)
Set switch S1 open
CR1= HP HSMS 286F (lower cost)

A brass shield was soldered over the receiver PCB.

Timing module modifications

C19=.022uF NPO ceramic (lower dielectric absorption than a film capacitor)
C20,21= .01uF NPO ceramic
R18=100K
R15=10K
R17=2.2M
R37, 42, 45 = 470
R32=330K
C26=1uF
C27=.01uF
C28=560pF
C31=47pF
Shunt C51 with 1000uF, 6V Al electrolytic

> Inadequate decoupling from on-board digital counters was creating excessive jitter at 60ft range.

R20 trimpot, adjust for max

U10,11,19,20 = TS272

The original TLC2262 op amps were dropping out on the cold temperature end. It is not clear whether this is a batch dependent problem with these op amps or whether the problem shows up at longer delays.

Tantalum thin film 8-resistor network (BI Technologies series 668A, available from Mouser at $3.10 each in unit quantities):

R28=10K network
R31=10K network
R32=30K network (3 in series)
R29=5K network (2 in parallel)
One network resistor is left for making changes to R28,29,31,32 for scale factor changes, as desired.

Signal processor modifications

Select jumper JP1 for envelope detection
Cut connection to U2 pin 6 (STC proportional to range)
C43=.01uF
C37=0.1uF
C31, 32=0.2uF
R57=10K
R64=33K
R65=15K
Add .01uF in shunt with R55 (second order envelope detector filtering)
U12=TS271 (original op amp, CLC401, is too drifty for slow risetime signals).

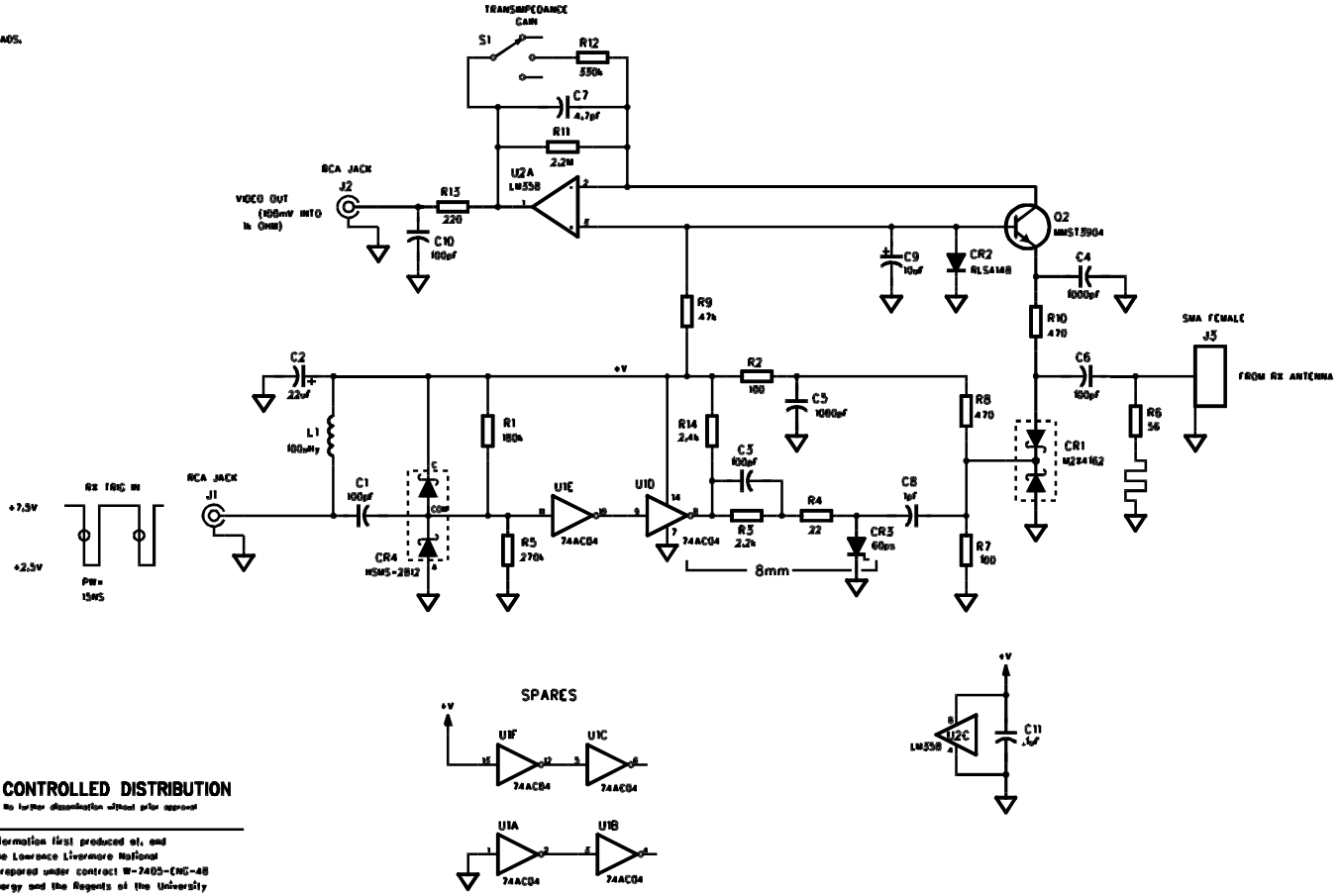
Stretch reset pulse:
R56=1meg
Shunt R56 with a 220 ohm in series with a 1N4148 diode, anode facing U9A
Connect .01uF from U9A pin 1 to gnd

Antenna modifications
Remove three damping resistors, and ensure that the feed section geometry is configured for 50 ohms.

REVISIONS					
ZONE	LTR	DESCRIPTION	DATE	DRAWN	APPROVED
/	0A	REVERSED INPUTS ON U2A	5/96	LUM	
/	0B	DEL Q1,R5,ADDED CR3,U1E	6/96	RDS	
/	0C	CH. CR1, MISC. CHANGES	7/96	RDS	

NOTES: UNLESS OTHERWISE SPECIFIED

1. FOR REFERENCE SEE:
   - LEA96-261732 ASSY
   - LEA96-261734 PWB
   - LEA96-261735 P/L
2. ALL RESISTOR VALUES ARE IN OHMS.
3. ALL CAPACITOR VALUES ARE IN MICROFARADS.



SPARES

Lawrence Livermore National Laboratory
Laser Programs

CONTROLLED DISTRIBUTION
No further dissemination without prior approval

This document contains planning information first produced at, and belonging to, Laser Programs at the Lawrence Livermore National Laboratory. This information was prepared under contract W-7405-ENG-48 between the U.S. Department of Energy and the Regents of the University of California. As an internal planning document, this information is not intended for distribution nor shall it be reproduced or disclosed to others without prior written permission from Laser Programs.
© The Regents of the University of California, 1995

CLASSIFICATION: UNCLASSIFIED

THIS DOCUMENT IS THE PROPERTY OF THE UNIVERSITY OF CALIFORNIA LAWRENCE LIVERMORE NATIONAL LABORATORY. REPRODUCTION PROHIBITED WITHOUT PERMISSION OF THE ELECTRONICS ENGINEERING DEPARTMENT.

TITLE CLASSIFICATION: UNCLASSIFIED

NEXT ASSY	USED ON
	APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONING AND TOLERANCING IAW ANSI Y14.5M-1982
DIMENSIONS IN INCHES
TOLERANCES ARE:
FRACTIONS DECIMALS ANGLES
DO NOT SCALE FROM DRAWING

CADD INFO
ICF/NOVA/T3726
PADS-LOGIC/96261731

DIV/GROUP	6/IOP
CONTRACT NO.	

APPROVALS	DATE
ORIGINATOR P. WELSH	3/96
DRAWN N. LUM	3/96
CHECKED	
APPROVED	
CLASSIFIED BY	
TITLE	

LAWRENCE LIVERMORE NATIONAL LABORATORY
University of California/Livermore California

TITLE
50 OHM IMPULSE RECEIVER – 60ps APERTURE/INT. FRONT END
RADAR TECHNOLOGY–MODULAR MIR
IMAGING DETECTION PROGRAM

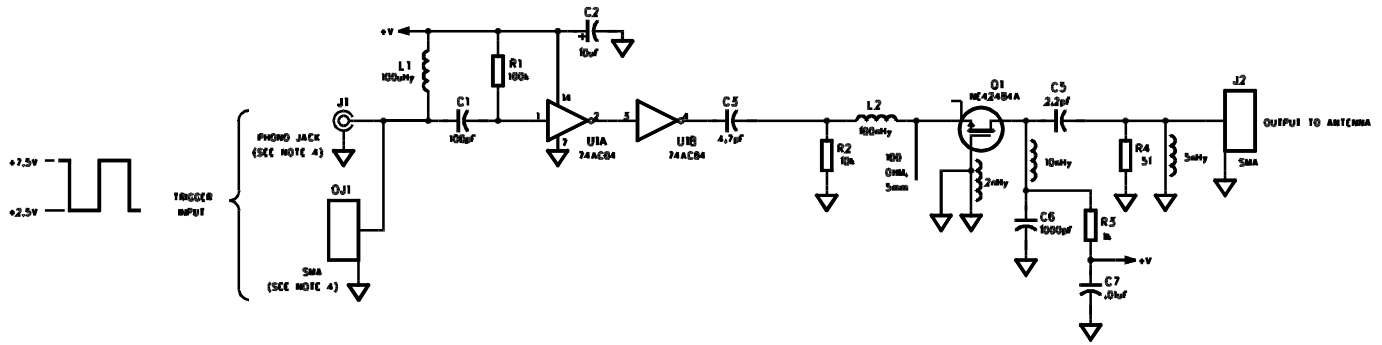
SIZE	CAGE CODE	DRAWING NUMBER	REV
C	14067	LEA96-261731	-0C

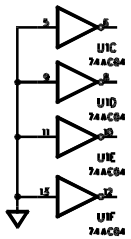
SHEET 1 OF 1

REVISIONS					
ZONE	LTR	DESCRIPTION	DATE	DRAWN	APPROVED
/	0A	CH. L2 TO AIR CORE. MISC. CHANGES	7/96	RDS	

NOTES: UNLESS OTHERWISE SPECIFIED:

1. FOR REFERENCE SEE:
   - LEA96-261762 ASSY
   - LEA96-261764 PWB
   - LEA96-261763 P/L
2. ALL RESISTOR VALUES ARE IN OHMS.
3. ALL CAPACITOR VALUES ARE IN MICROFARADS.
4. RIGHT ANGLE PHONO PLUG OR EDGE LAUNCH SMA MAY BE USED (BUT NOT BOTH).





Lawrence Livermore National Laboratory
Laser Programs

CONTROLLED DISTRIBUTION
No further dissemination without prior approval

This document contains planning information first produced at, and belonging to, Laser Programs of the Lawrence Livermore National Laboratory. This information was prepared under contract W-7405-ENG-48 between the U.S. Department of Energy and the Regents of the University of California. As an internal planning document, this information is not intended for distribution nor shall it be reproduced or disclosed to others without prior written permission from Laser Programs.

© The Regents of the University of California, 1995

CLASSIFICATION: UNCLASSIFIED

THIS DOCUMENT IS THE PROPERTY OF THE UNIVERSITY OF CALIFORNIA LAWRENCE LIVERMORE NATIONAL LABORATORY. REPRODUCTION PROHIBITED WITHOUT PERMISSION OF THE ELECTRONICS ENGINEERING DEPARTMENT.

TITLE CLASSIFICATION: UNCLASSIFIED

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED

DIMENSIONING AND TOLERANCING IAW ANSI Y14.5M-1982

DIMENSIONS IN INCHES

TOLERANCES ARE:
FRACTIONS DECIMALS ANGLES

DO NOT SCALE FROM DRAWING

CADD INFO
ICF/NOVA/13726
PADS-LOGIC/96261761

DIV/GROUP 6/IDP

CONTRACT NO.

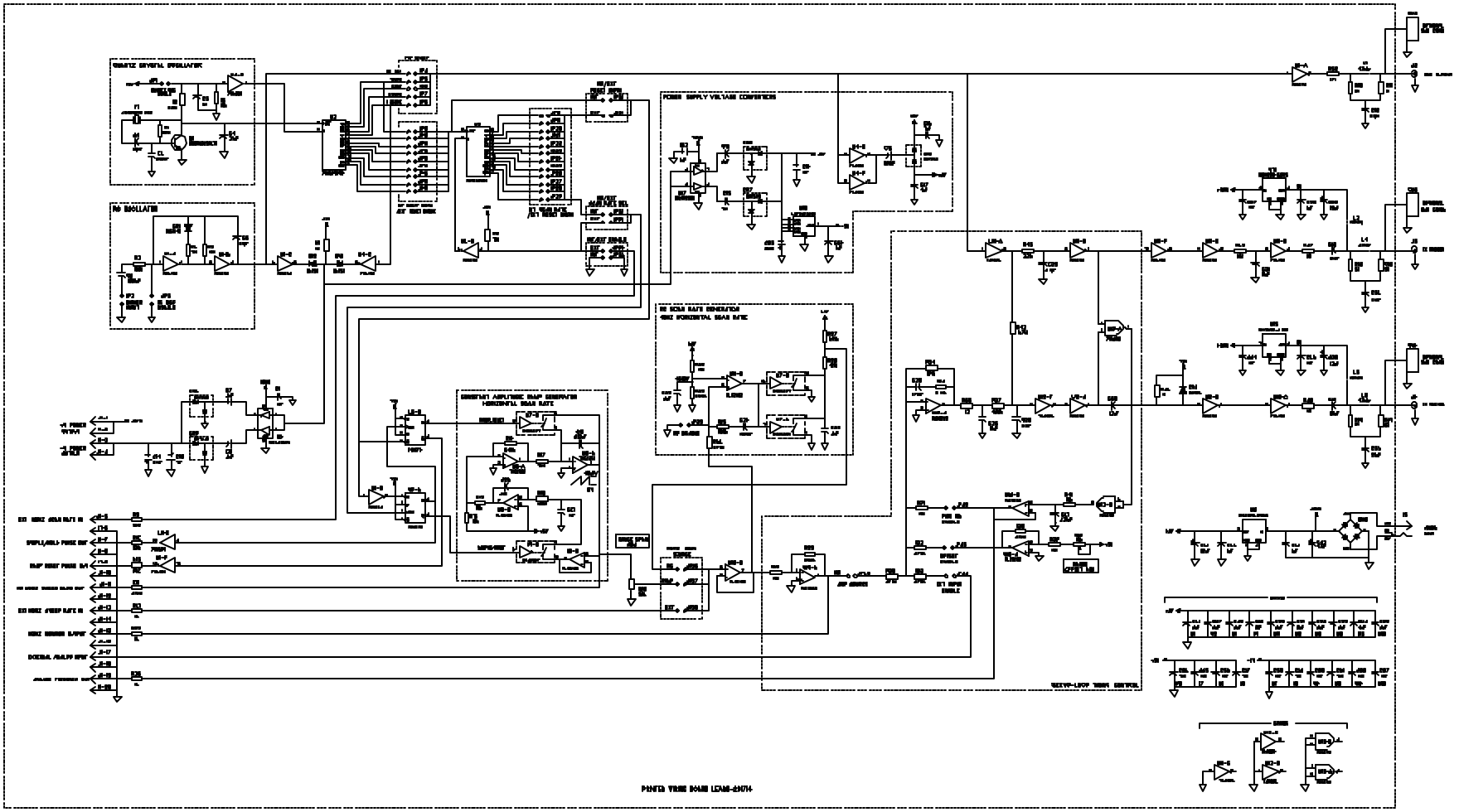
APPROVALS	DATE
ORIGINATOR T. McEWAN	4/96
DRAWN SHAW	4/96
CHECKED	
APPROVED	
CLASSIFIED BY	
TITLE	

LAWRENCE LIVERMORE NATIONAL LABORATORY
University of California/Livermore California

TITLE
50 OHM PULSED RF TRANSMITTER – 6.5 GHz C.F.
RADAR TECHNOLOGY – MODULAR MIR
IMAGING DETECTION PROGRAM

SIZE	CAGE CODE	DRAWING NUMBER	REV
C	14067	LEA96-261761	0A

SHEET 1 OF 1



NOTES: UNLESS OTHERWISE SPECIFIED

1 PIN REFERENCE KEY
LEAD-28772 4387
LEAD-28774 PIN
LEAD-28776 P/L

2 ALL RESISTOR FAILURES ARE IN OHMS

3 ALL CAPACITOR FAILURES ARE IN MICROFARADS

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
/	A	ADD/CHANGE PER SPOOL 28-0000	3/97	MS
/	B	[illegible]	4/97	MS
/	C	[illegible]	5/98	MS

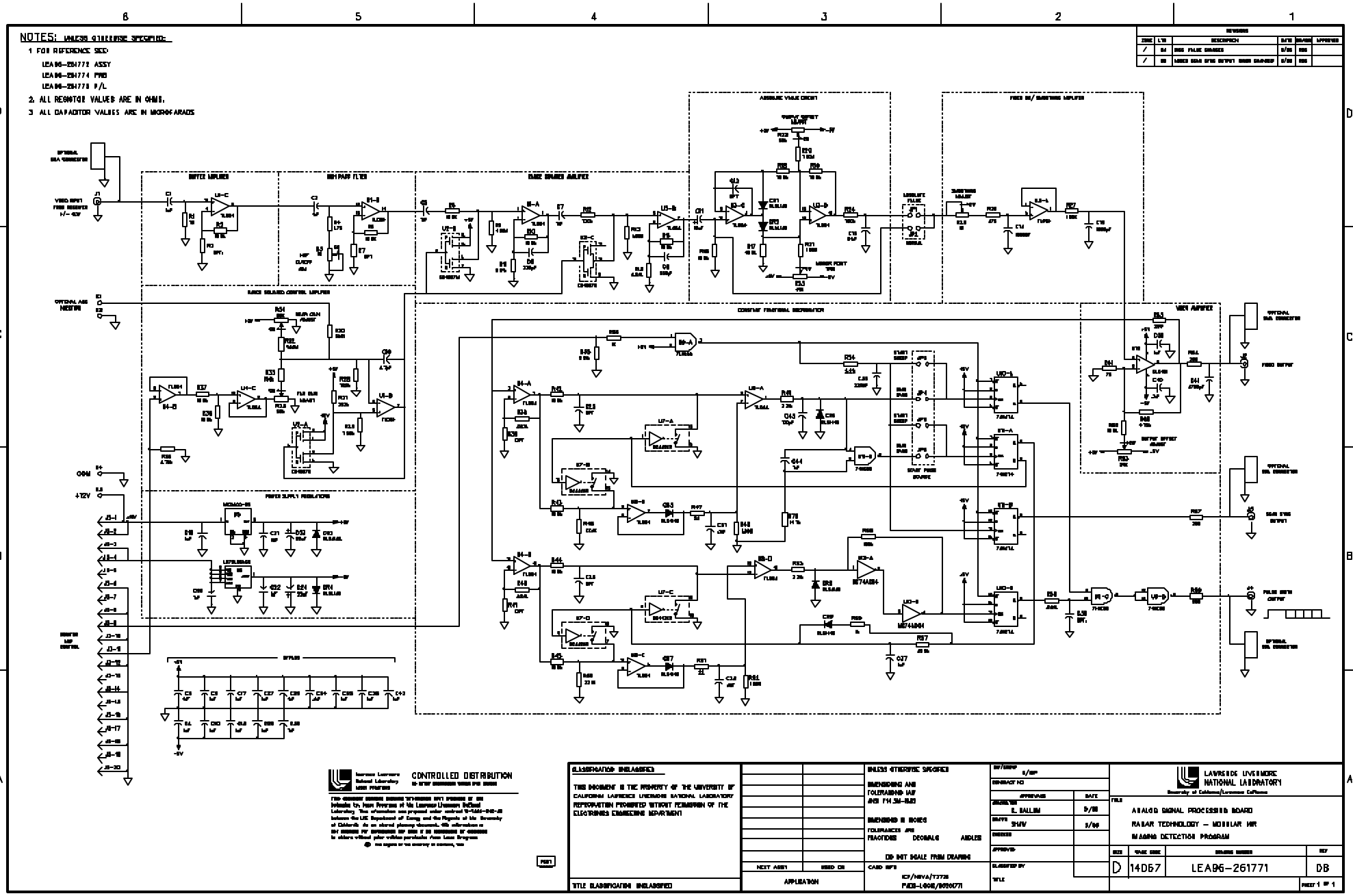
LAWRENCE LIVERMORE NATIONAL LABORATORY
University of California/Livermore California

BEAM TECHNOLOGY — BEAM LAB

BEAMS DIVISION PROGRAM

SIZE	DRAWING NUMBER	REV
E	14D67 LEAD0-261711	0C

SHEET 1 OF 1


NOTES: UNLESS OTHERWISE SPECIFIED:
1 FOR REFERENCE SEE:
LEA96-261772 ASSY
LEA96-261774 PWB
LEA96-261778 P/L
2. ALL RESISTOR VALUES ARE IN OHMS.
3 ALL CAPACITOR VALUES ARE IN MICROFARADS
REVISIONS
BUFFER AMPLIFIER
HIGH PASS FILTER
BIAS BOARD CONTROL AMPLIFIER
POWER SUPPLY REGULATORS
BIASING
ABSOLUTE VALUE CIRCUIT
FIXED GAIN/SUMMING AMPLIFIER
CONSTANT FRACTIONAL DISCRIMINATOR
VIDEO AMPLIFIER
CONTROLLED DISTRIBUTION
CLASSIFICATION: UNCLASSIFIED
THIS DOCUMENT IS THE PROPERTY OF THE UNIVERSITY OF CALIFORNIA LAWRENCE LIVERMORE NATIONAL LABORATORY
REPRODUCTION PROHIBITED WITHOUT PERMISSION OF THE ELECTRONICS ENGINEERING DEPARTMENT
UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ARE
FRACTIONS DECIMALS ANGLES
DO NOT SCALE FROM DRAWING
CAGE NO'S
ICF/HAVA/T3728
FSCM-L4068/0276771
APPLICATION
NEXT ASSY
USED ON
APPROVALS
DATE
E. BALLEN
9/98
SHAV
9/98
LAWRENCE LIVERMORE NATIONAL LABORATORY
University of California/Lawrence CalPoma
TITLE
ANALOG SIGNAL PROCESSING BOARD
RADAR TECHNOLOGY – MODULAR MM
IMAGING DETECTION PROGRAM
SIZE
FSCM NO.
DRAWING NUMBER
REV
D
14067
LEA96-261771
DB
SHEET 1 OF 1